

**§ 86.007-17**

**40 CFR Ch. I (7-1-13 Edition)**

of § 86.007-11(g)(1) (both from the number of engines complying with the standards being phased-in and from the total number of U.S.-directed production engines.)

(ii) Manufacturers certifying a split Otto-cycle engine family to both the Phase 1 and Phase 2 standards with equally sized subfamilies may exclude the engines within that split family from end-of-year NO<sub>x</sub> (or NO<sub>x</sub>+NMHC) ABT calculations, provided that neither subfamily generates credits for use by other engine families, or uses banked credits, or uses averaging credits from other engine families. All of the engines in that split family must be excluded from the phase-in calculations of § 86.008-10(f)(1) (both from the number of engines complying with the standards being phased-in and from the total number of U.S.-directed production engines.)

(iii) Manufacturers certifying a split engine family may label all of the engines within that family with a single NO<sub>x</sub> or NO<sub>x</sub>+NMHC FEL. The FEL on the label will apply for all SEA or other compliance testing.

(iv) Notwithstanding the provisions of paragraph (m)(9)(iii) of this section, for split families, the NO<sub>x</sub> FEL shall be used to determine applicability of the provisions of §§ 86.007-11(a)(3)(ii), (a)(4)(i)(B), and (h)(1), and 86.008-10(g).

(10) For model years 2007 through 2009, to be consistent with the phase-in provisions of § 86.007-11(g)(1), credits generated from engines in one diesel engine service class (e.g., light-heavy duty diesel engines) may be used for averaging by engines in a different diesel engine service class, provided the credits are calculated for both engine families using the conversion factor and useful life of the engine family using the credits, and the engine family using the credits is certified to the standards listed in § 86.007-11(a)(1). Banked or traded credits may not be used by any engine family in a different service class than the service class of the engine family generating the credits.

[66 FR 5163, Jan. 18, 2001]

**§ 86.007-17 On-board Diagnostics for engines used in applications less than or equal to 14,000 pounds GVWR.**

(a) *General.* (1) All heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less must be equipped with an on-board diagnostic (OBD) system capable of monitoring all emission-related engine systems or components during the applicable useful life. Heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less must meet the OBD requirements of this section according to the phase-in schedule in paragraph (k) of this section. All monitored systems and components must be evaluated periodically, but no less frequently than once per applicable certification test cycle as defined in appendix I, paragraph (f), of this part, or similar trip as approved by the Administrator.

(2) An OBD system demonstrated to fully meet the requirements in § 86.1806-05 may be used to meet the requirements of this section, provided that the Administrator finds that a manufacturer's decision to use the flexibility in this paragraph (a)(2) is based on good engineering judgment.

(b) *Malfunction descriptions.* The OBD system must detect and identify malfunctions in all monitored emission-related engine systems or components according to the following malfunction definitions as measured and calculated in accordance with test procedures set forth in subpart N of this part (engine-based test procedures) excluding the test procedure referred to as the "Supplemental emission test; test cycle and procedures" contained in § 86.1360, and excluding the test procedure referred to as the "Not-To-Exceed Test Procedure" contained in § 86.1370, and excluding the test procedure referred to as the "Load Response Test" contained in § 86.1380.

(1) *Catalysts and particulate filters*—(i) *Otto-cycle.* Catalyst deterioration or malfunction before it results in an increase in NMHC (or NO<sub>x</sub>+NMHC, as applicable) emissions 1.5 times the NMHC (or NO<sub>x</sub>+NMHC, as applicable) standard or family emission limit (FEL), as compared to the NMHC (or NO<sub>x</sub>+NMHC, as applicable) emission

level measured using a representative 4000 mile catalyst system.

(ii) *Diesel*. (A) If equipped, reduction catalyst deterioration or malfunction before it results in exhaust NO<sub>x</sub> emissions exceeding, for model years 2007 through 2012, either 1.75 times the applicable NO<sub>x</sub> standard for engines certified to a NO<sub>x</sub> family emission limit (FEL) greater than 0.50 g/bhp-hr, or the applicable NO<sub>x</sub> FEL+0.6 g/bhp-hr for engines certified to a NO<sub>x</sub> FEL less than or equal to 0.50 g/bhp-hr and, for model years 2013 and later, the applicable NO<sub>x</sub> FEL+0.3 g/bhp-hr. If equipped, diesel oxidation catalyst (DOC) deterioration or malfunction before it results in exhaust NMHC emissions exceeding, for model years 2010 through 2012, 2.5 times the applicable NMHC standard and, for model years 2013 and later, 2 times the applicable NMHC standard. These catalyst monitoring requirements need not be done if the manufacturer can demonstrate that deterioration or malfunction of the system will not result in exceedance of the threshold. As an alternative, oxidation catalyst deterioration or malfunction before it results in an inability to achieve a temperature rise of 100 degrees C, or to reach the necessary diesel particulate filter (DPF) regeneration temperature, within 60 seconds of initiating an active DPF regeneration. Further, oxidation catalyst deterioration or malfunction when the DOC is unable to sustain the necessary regeneration temperature for the duration of the regeneration event. The OBD or control system must abort the regeneration if the regeneration temperature has not been reached within five minutes of initiating an active regeneration event, and if the regeneration temperature cannot be sustained for the duration of the regeneration event.

(B) If equipped with a DPF for model years 2007 through 2009, catastrophic failure of the device must be detected. Any DPF whose complete failure results in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC (or NO<sub>x</sub>+NMHC, as applicable) or PM must be monitored for such catastrophic failure. This monitoring need not be done if the manufacturer can demonstrate that a catastrophic failure of the system will not

result in exceedance of the threshold. If equipped with a DPF for model years 2010 and later, DPF deterioration or malfunction before it results in exhaust emissions exceeding the applicable PM FEL+0.04 g/bhp-hr or 0.05 g/bhp-hr PM, whichever is higher. As an alternative to this requirement for 2010 through 2012, the OBD system can be designed to detect a malfunction based on a detectable decrease in the expected pressure drop across the DPF for a period of 5 seconds or more, whenever the engine is speed is greater than or equal to 50% (as defined in §1065.610, Eq. 1065.610-3) and engine load, or torque, is greater than or equal to 50% of the maximum available at that speed under standard emission test conditions. For purposes of this paragraph, the detectable change in pressure drop is defined by operating the engine at its 50% speed and 50% load point under standard emission test conditions, observing the pressure drop on a clean DPF, and multiplying the observed pressure drop by 0.5. The detectable change in pressure drop shall be reported in units of kilopascals (kPa). At time of certification, manufacturers shall provide the detectable change in pressure drop value along with OBD engine data parameters recorded at the following nine engine speed/load operating points with a clean DPF: 50% speed, 50% load; 50% speed, 75% load, 50% speed, 100% load; 75% speed, 50% load; 75% speed, 75% load; 75% speed, 100% load; 100% speed, 50% load; 100% speed, 75% load; and 100% speed, 100% load. The OBD engine data parameters to be reported are described in §86.010-18(k)(4)(ii) and shall include the following: engine speed; calculated load; air flow rate from mass air flow sensor (if so equipped); fuel rate; and DPF delta pressure. On all engines so equipped, catastrophic failure of the particulate trap must also be detected. In addition, the absence of the particulate trap or the trapping substrate must be detected.

(2) *Engine misfire*—(i) *Otto-cycle*. Engine misfire resulting in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC, NO<sub>x</sub> (or NO<sub>x</sub>+NMHC, as applicable) or CO; and any misfire capable of damaging the catalytic converter.

(ii) *Diesel*. Lack of cylinder combustion must be detected.

(3) *Exhaust gas sensors*—(i) *Oxygen sensors and air-fuel ratio sensors downstream of aftertreatment devices*—(A) *Otto-cycle*. If equipped, sensor deterioration or malfunction resulting in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC, NO<sub>x</sub> or CO.

(B) *Diesel*. If equipped, sensor deterioration or malfunction resulting in exhaust emissions exceeding any of the following levels: The applicable PM FEL+0.04 g/bhp-hr or 0.05 g/bhp-hr PM, whichever is higher; or, for model years 2007 through 2012, 1.75 times the applicable NO<sub>x</sub> standard for engines certified to a NO<sub>x</sub> FEL greater than 0.50 g/bhp-hr, or, the applicable NO<sub>x</sub> FEL+0.6 g/bhp-hr for engines certified to a NO<sub>x</sub> FEL less than or equal to 0.50 g/bhp-hr and, for model years 2013 and later, the applicable NO<sub>x</sub> FEL+0.3 g/bhp-hr; or, for model years 2010 through 2012, 2.5 times the applicable NMHC standard and, for model years 2013 and later, 2 times the applicable NMHC standard.

(ii) *Oxygen sensors and air-fuel ratio sensors upstream of aftertreatment devices*—(A) *Otto-cycle*. If equipped, sensor deterioration or malfunction resulting in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC, NO<sub>x</sub> or CO.

(B) *Diesel*. If equipped, sensor deterioration or malfunction resulting in exhaust emissions exceeding any of the following levels: for model years 2007 through 2009, the applicable PM FEL+0.04 g/bhp-hr or 0.05 g/bhp-hr PM, whichever is higher and, for model years 2010 and later, the applicable PM FEL+0.02 g/bhp-hr or 0.03 g/bhp-hr PM, whichever is higher; or, for model years 2007 through 2012, 1.75 times the applicable NO<sub>x</sub> standard for engines certified to a NO<sub>x</sub> FEL greater than 0.50 g/bhp-hr, or the applicable NO<sub>x</sub> FEL+0.6 g/bhp-hr for engines certified to a NO<sub>x</sub> FEL less than or equal to 0.50 g/bhp-hr and, for model years 2013 and later, the applicable NO<sub>x</sub> FEL+0.3 g/bhp-hr; or, for model years 2007 through 2012, 2.5 times the applicable NMHC standard and, for model years 2013 and later, 2 times the applicable NMHC standard; or, for 2007 through 2012, 2.5 times the applicable CO standard and, for model

years 2013 and later, 2 times the applicable CO standard.

(iii) *NO<sub>x</sub> sensors*—(A) *Otto-cycle*. If equipped, sensor deterioration or malfunction resulting in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC, NO<sub>x</sub> or CO.

(B) *Diesel*. If equipped, sensor deterioration or malfunction resulting in exhaust emissions exceeding any of the following levels: the applicable PM FEL+0.04 g/bhp-hr or 0.05 g/bhp-hr PM, whichever is higher; or, for model years 2007 through 2012, 1.75 times the applicable NO<sub>x</sub> standard for engines certified to a NO<sub>x</sub> FEL greater than 0.50 g/bhp-hr; or, the applicable NO<sub>x</sub> FEL+0.6 g/bhp-hr for engines certified to a NO<sub>x</sub> FEL less than or equal to 0.50 g/bhp-hr and, for model years 2013 and later, the applicable NO<sub>x</sub> FEL+0.3 g/bhp-hr.

(4) *Evaporative leaks*. If equipped, any vapor leak in the evaporative and/or refueling system (excluding the tubing and connections between the purge valve and the intake manifold) greater than or equal in magnitude to a leak caused by a 0.040 inch diameter orifice; an absence of evaporative purge air flow from the complete evaporative emission control system. Where fuel tank capacity is greater than 25 gallons, the Administrator may, following a request from the manufacturer, revise the size of the orifice to the smallest orifice feasible, based on test data, if the most reliable monitoring method available cannot reliably detect a system leak equal to a 0.040 inch diameter orifice.

(5) *Other emission control systems and components*—(i) *Otto-cycle*. Any deterioration or malfunction occurring in an engine system or component directly intended to control emissions, including but not necessarily limited to, the exhaust gas recirculation (EGR) system, if equipped, the secondary air system, if equipped, and the fuel control system, singularly resulting in exhaust emissions exceeding 1.5 times the applicable emission standard or FEL for NMHC, NO<sub>x</sub> or CO. For engines equipped with a secondary air system, a functional check, as described in paragraph (b)(6) of this section, may satisfy the requirements of this paragraph (b)(5) provided the manufacturer can demonstrate that deterioration of

the flow distribution system is unlikely. This demonstration is subject to Administrator approval and, if the demonstration and associated functional check are approved, the diagnostic system must indicate a malfunction when some degree of secondary airflow is not detectable in the exhaust system during the check. For engines equipped with positive crankcase ventilation (PCV), monitoring of the PCV system is not necessary provided the manufacturer can demonstrate to the Administrator's satisfaction that the PCV system is unlikely to fail.

(ii) *Diesel*. Any deterioration or malfunction occurring in an engine system or component directly intended to control emissions, including but not necessarily limited to, the exhaust gas recirculation (EGR) system, if equipped, and the fuel control system, singularly resulting in exhaust emissions exceeding any of the following levels: for model years 2007 through 2009, the applicable PM FEL+0.04 g/bhp-hr or 0.05 g/bhp-hr PM, whichever is higher and, for model years 2010 and later, the applicable PM FEL+0.02 g/bhp-hr or 0.03 g/bhp-hr PM, whichever is higher; or, for model years 2007 through 2012, 1.75 times the applicable NO<sub>x</sub> standard for engines certified to a NO<sub>x</sub> FEL greater than 0.50 g/bhp-hr or the applicable NO<sub>x</sub> FEL+0.6 g/bhp-hr for engines certified to a NO<sub>x</sub> FEL less than or equal to 0.50 g/bhp-hr and, for model years 2013 and later, the applicable NO<sub>x</sub> FEL+0.3 g/bhp-hr; or, for model years 2007 through 2012, 2.5 times the applicable NMHC standard and, for model years 2013 and later, 2 times the applicable NMHC standard; or, for model years 2007 through 2012, 2.5 times the applicable CO standard and, for model years 2013 and later, 2 times the applicable CO standard. A functional check, as described in paragraph (b)(6) of this section, may satisfy the requirements of this paragraph (b)(5) provided the manufacturer can demonstrate that a malfunction would not cause emissions to exceed the applicable levels. This demonstration is subject to Administrator approval. For engines equipped with crankcase ventilation (CV), monitoring of the CV system is not necessary provided the manufacturer can demonstrate to the Administrator's

satisfaction that the CV system is unlikely to fail.

(6) *Other emission-related engine components*. Any other deterioration or malfunction occurring in an electronic emission-related engine system or component not otherwise described above that either provides input to or receives commands from the on-board computer and has a measurable impact on emissions; monitoring of components required by this paragraph (b)(6) must be satisfied by employing electrical circuit continuity checks and rationality checks for computer input components (input values within manufacturer specified ranges based on other available operating parameters), and functionality checks for computer output components (proper functional response to computer commands) except that the Administrator may waive such a rationality or functionality check where the manufacturer has demonstrated infeasibility. Malfunctions are defined as a failure of the system or component to meet the electrical circuit continuity checks or the rationality or functionality checks.

(7) *Performance of OBD functions*. Any sensor or other component deterioration or malfunction which renders that sensor or component incapable of performing its function as part of the OBD system must be detected and identified on engines so equipped.

(c) *Malfunction indicator light (MIL)*. The OBD system must incorporate a malfunction indicator light (MIL) readily visible to the vehicle operator. When illuminated, the MIL must display "Check Engine," "Service Engine Soon," a universally recognizable engine symbol, or a similar phrase or symbol approved by the Administrator. More than one general purpose malfunction indicator light for emission-related problems should not be used; separate specific purpose warning lights (e.g., brake system, fasten seat belt, oil pressure, etc.) are permitted. The use of red for the OBD-related malfunction indicator light is prohibited.

(d) *MIL illumination*—(1) The MIL must illuminate and remain illuminated when any of the conditions specified in paragraph (b) of this section are detected and verified, or whenever the

engine control enters a default or secondary mode of operation considered abnormal for the given engine operating conditions. The MIL must blink once per second under any period of operation during which engine misfire is occurring and catalyst damage is imminent. If such misfire is detected again during the following driving cycle (i.e., operation consisting of, at a minimum, engine start-up and engine shut-off) or the next driving cycle in which similar conditions are encountered, the MIL must maintain a steady illumination when the misfire is not occurring and then remain illuminated until the MIL extinguishing criteria of this section are satisfied. The MIL must also illuminate when the vehicle's ignition is in the "key-on" position before engine starting or cranking and extinguish after engine starting if no malfunction has previously been detected. If a fuel system or engine misfire malfunction has previously been detected, the MIL may be extinguished if the malfunction does not reoccur during three subsequent sequential trips during which similar conditions are encountered and no new malfunctions have been detected. Similar conditions are defined as engine speed within 375 rpm, engine load within 20 percent, and engine warm-up status equivalent to that under which the malfunction was first detected. If any malfunction other than a fuel system or engine misfire malfunction has been detected, the MIL may be extinguished if the malfunction does not reoccur during three subsequent sequential trips during which the monitoring system responsible for illuminating the MIL functions without detecting the malfunction, and no new malfunctions have been detected. Upon Administrator approval, statistical MIL illumination protocols may be employed, provided they result in comparable timeliness in detecting a malfunction and evaluating system performance, i.e., three to six driving cycles would be considered acceptable.

(2) *Drive cycle or driving cycle*, in the context of this § 86.007-17 and for model years 2010 and later, a drive cycle means operation that consists of engine startup and engine shutoff and includes the period of engine off time up

to the next engine startup. For vehicles that employ engine shutoff strategies (e.g., engine shutoff at idle), the manufacturer may use an alternative definition for drive cycle (e.g., key-on followed by key-off). Any alternative definition must be based on equivalence to engine startup and engine shutoff signaling the beginning and ending of a single driving event for a conventional vehicle. For applications that span 14,000 pounds GVWR, the manufacturer may use the drive cycle definition of § 86.010-18 in lieu of the definition in this paragraph.

(e) *Storing of computer codes*. The OBD system shall record and store in computer memory diagnostic trouble codes and diagnostic readiness codes indicating the status of the emission control system. These codes shall be available through the standardized data link connector per specifications as referenced in paragraph (h) of this section.

(1) A diagnostic trouble code must be stored for any detected and verified malfunction causing MIL illumination. The stored diagnostic trouble code must identify the malfunctioning system or component as uniquely as possible. At the manufacturer's discretion, a diagnostic trouble code may be stored for conditions not causing MIL illumination. Regardless, a separate code should be stored indicating the expected MIL illumination status (i.e., MIL commanded "ON," MIL commanded "OFF").

(2) For a single misfiring cylinder, the diagnostic trouble code(s) must uniquely identify the cylinder, unless the manufacturer submits data and/or engineering evaluations which adequately demonstrate that the misfiring cylinder cannot be reliably identified under certain operating conditions. For diesel engines only, the specific cylinder for which combustion cannot be detected need not be identified if new hardware would be required to do so. The diagnostic trouble code must identify multiple misfiring cylinder conditions; under multiple misfire conditions, the misfiring cylinders need not be uniquely identified if a distinct multiple misfire diagnostic trouble code is stored.

(3) The diagnostic system may erase a diagnostic trouble code if the same code is not re-registered in at least 40 engine warm-up cycles, and the malfunction indicator light is not illuminated for that code.

(4) Separate status codes, or readiness codes, must be stored in computer memory to identify correctly functioning emission control systems and those emission control systems which require further engine operation to complete proper diagnostic evaluation. A readiness code need not be stored for those monitors that can be considered continuously operating monitors (e.g., misfire monitor, fuel system monitor, etc.). Readiness codes should never be set to "not ready" status upon key-on or key-off; intentional setting of readiness codes to "not ready" status via service procedures must apply to all such codes, rather than applying to individual codes. Subject to Administrator approval, if monitoring is disabled for a multiple number of driving cycles (i.e., more than one) due to the continued presence of extreme operating conditions (e.g., ambient temperatures below 40 °F, or altitudes above 8000 feet), readiness for the subject monitoring system may be set to "ready" status without monitoring having been completed. Administrator approval shall be based on the conditions for monitoring system disablement, and the number of driving cycles specified without completion of monitoring before readiness is indicated.

(f) *Available diagnostic data.* (1) Upon determination of the first malfunction of any component or system, "freeze frame" engine conditions present at the time must be stored in computer memory. Should a subsequent fuel system or misfire malfunction occur, any previously stored freeze frame conditions must be replaced by the fuel system or misfire conditions (whichever occurs first). Stored engine conditions must include, but are not limited to: engine speed, open or closed loop operation, fuel system commands, coolant temperature, calculated load value, fuel pressure, vehicle speed, air flow rate, and intake manifold pressure if the information needed to determine these conditions is available to the computer. For freeze frame storage,

the manufacturer must include the most appropriate set of conditions to facilitate effective repairs. If the diagnostic trouble code causing the conditions to be stored is erased in accordance with paragraph (d) of this section, the stored engine conditions may also be erased.

(2) The following data in addition to the required freeze frame information must be made available on demand through the serial port on the standardized data link connector, if the information is available to the on-board computer or can be determined using information available to the on-board computer: Diagnostic trouble codes, engine coolant temperature, fuel control system status (closed loop, open loop, other), fuel trim, ignition timing advance, intake air temperature, manifold air pressure, air flow rate, engine RPM, throttle position sensor output value, secondary air status (upstream, downstream, or atmosphere), calculated load value, vehicle speed, and fuel pressure. The signals must be provided in standard units based on SAE specifications as referenced in paragraph (h) of this section. Actual signals must be clearly identified separately from default value or limp home signals.

(3) For all OBD systems for which specific on-board evaluation tests are conducted (catalyst, oxygen sensor, etc.), the results of the most recent test performed by the vehicle, and the limits to which the system is compared must be available through the standardized data link connector per the appropriate standardized specifications as referenced in paragraph (h) of this section.

(4) Access to the data required to be made available under this section shall be unrestricted and shall not require any access codes or devices that are only available from the manufacturer.

(g) *Exceptions.* The OBD system is not required to evaluate systems or components during malfunction conditions if such evaluation would result in a risk to safety or failure of systems or components. Additionally, the OBD system is not required to evaluate systems or components during operation of a power take-off unit such as a dump

bed, snow plow blade, or aerial bucket, etc.

(h) *Reference materials.* The following documents are incorporated by reference, see § 86.1. Anyone may inspect copies at the U.S. EPA or at the National Archives and Records Administration (NARA). For information on the availability of this material at U.S. EPA, NARA, or the standard making bodies directly, refer to § 86.1.

(1) *SAE material.* (i) SAE J1850, Revised May 2001, shall be used as the on-board to off-board communications protocol. All emission related messages sent to the scan tool over a J1850 data link shall use the Cyclic Redundancy Check and the three byte header, and shall not use inter-byte separation or check sums.

(ii) SAE J1979, Revised April 2002. Basic diagnostic data (as specified in § 86.007-17(e) and (f)) shall be provided in the format and units in this industry standard.

(iii) SAE J2012, Revised April 2002. Diagnostic trouble codes shall be consistent with this industry standard.

(iv) SAE J1962, Revised April 2002. The connection interface between the OBD system and test equipment and diagnostic tools shall meet the functional requirements of this industry standard.

(v) SAE J1930, Revised April 2002; or, SAE J2403, Revised August 2007. All acronyms, definitions and abbreviations shall be formatted according to one or the other of these industry standards.

(vi) SAE J1978, Revised April 2002. All equipment used to interface, extract and display OBD-related information shall meet this industry standard.

(vii) As an alternative to the above standards, heavy-duty vehicles may conform to the specifications of these SAE standards: SAE J1939-11, Revised October 1999; SAE J1939-13, July 1999; SAE J1939-21, Revised April 2001; SAE J1939-31, Revised December 1997; SAE J1939-71, Revised August 2002; SAE J1939-73, Revised June 2001; SAE J1939-81, July 1997.

(2) *ISO materials.* (i) ISO 9141-2, February 1, 1994. This industry standard may be used as an alternative to SAE J1850 (as specified in paragraph (h)(1)(i)

of this section) as the on-board to off-board communications protocol.

(ii) ISO 14230-4:2000(E), June 1, 2000. This industry standard may be used as an alternative to SAE J1850 (as specified in paragraph (h)(1)(i) of this section) as the on-board to off-board communications protocol.

(iii) ISO 15765-4.3:2001, December 14, 2001. This industry standard may be used as an alternative to SAE J1850 (as specified in paragraph (h)(1)(i) of this section) as the on-board to off-board communications protocol.

(iv) ISO 15765-4:2005(E), January 15, 2005. Beginning with the 2008 model year and beyond, this industry standard shall be the only acceptable protocol used for standardized on-board to off-board communications for vehicles below 8500 pounds. For vehicles 8500 to 14000 pounds, either this ISO industry standard or the SAE standards listed in paragraph (h)(1)(vii) of this section shall be the only acceptable protocols used for standardized on-board to off-board communications.

(i) *Deficiencies and alternative fueled engines.* Upon application by the manufacturer, the Administrator may accept an OBD system as compliant even though specific requirements are not fully met. Such compliances without meeting specific requirements, or deficiencies, will be granted only if compliance would be infeasible or unreasonable considering such factors as, but not limited to: technical feasibility of the given monitor and lead time and production cycles including phase-in or phase-out of engines or vehicle designs and programmed upgrades of computers. Unmet requirements should not be carried over from the previous model year except where unreasonable hardware or software modifications would be necessary to correct the deficiency, and the manufacturer has demonstrated an acceptable level of effort toward compliance as determined by the Administrator. Furthermore, EPA will not accept any deficiency requests that include the complete lack of a major diagnostic monitor ("major" diagnostic monitors being those for exhaust aftertreatment devices, oxygen sensor, air-fuel ratio sensor, NO<sub>x</sub> sensor, engine misfire, evaporative leaks, and diesel EGR, if equipped), with the

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possible exception of the special provisions for alternative fueled engines. For alternative fueled heavy-duty engines (e.g., natural gas, liquefied petroleum gas, methanol, ethanol), manufacturers may request the Administrator to waive specific monitoring requirements of this section for which monitoring may not be reliable with respect to the use of the alternative fuel. At a minimum, alternative fuel engines must be equipped with an OBD system meeting OBD requirements to the extent feasible as approved by the Administrator.

(j) *California OBDII compliance option.* For heavy-duty engines used in applications weighing 14,000 pounds GVWR or less, demonstration of compliance with California OBD II requirements (Title 13 California Code of Regulations § 1968.2 (13 CCR 1968.2)), as modified and approved on November 9, 2007 (incorporated by reference, see § 86.1), shall satisfy the requirements of this section, except that compliance with 13 CCR 1968.2(e)(4.2.2)(C), pertaining to 0.02 inch evaporative leak detection, and 13 CCR 1968.2(d)(1.4), pertaining to tampering protection, are not required to satisfy the requirements of this section. Also, the deficiency provisions of 13 CCR 1968.2(k) do not apply. The defi-

ciency provisions of paragraph (i) of this section and the evaporative leak detection requirement of paragraph (b)(4) of this section apply to manufacturers selecting this paragraph (j) for demonstrating compliance. In addition, demonstration of compliance with 13 CCR 1968.2(e)(15.2.1)(C), to the extent it applies to the verification of proper alignment between the camshaft and crankshaft, applies only to vehicles equipped with variable valve timing.

(k) *Phase-in for heavy-duty engines.* Manufacturers of heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR must comply with the OBD requirements in this section according to the following phase-in schedule, based on the percentage of projected engine sales within each category. The 2007 requirements in the following phase-in schedule apply to all heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less. For the purposes of calculating compliance with the phase-in provisions of this paragraph (k), heavy-duty engines may be combined with heavy-duty vehicles subject to the phase-in requirements of paragraph § 86.1806–05(1). The OBD Compliance phase-in table follows:

OBD COMPLIANCE PHASE-IN FOR HEAVY-DUTY ENGINES INTENDED FOR USE IN A HEAVY-DUTY VEHICLE WEIGHING 14,000 POUNDS GVWR OR LESS

Model year	Otto-cycle phase-in based on projected sales	Diesel phase-in based on projected sales
2007 MY .....	80% compliance; alternative fuel waivers available.	100% compliance.
2008+ MY 100% compliance .....	100% compliance .....	100% compliance.

[74 FR 8356, Feb. 24, 2009]

### § 86.007–21 Application for certification.

Section 86.007–21 includes text that specifies requirements that differ from § 86.004–21, 86.094–21 or 86.096–21. Where a paragraph in § 86.004–21, 86.094–21 or 86.096–21 is identical and applicable to § 86.007–21, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see § 86.004–21.”, “[Reserved]. For guidance see § 86.094–21.”, or “[Reserved]. For guidance see § 86.096–21.”.

(a)–(b)(3) [Reserved]. For guidance see § 86.094–21.

(b)(4)(i) [Reserved]. For guidance see § 86.004–21.

(b)(4)(ii)–(b)(5)(iv) [Reserved]. For guidance see § 86.094–21.

(b)(5)(v)–(b)(6) [Reserved]. For guidance see § 86.004–21.

(b)(7)–(b)(8) [Reserved]. For guidance see § 86.094–21.

(b)(9)–(b)(10) [Reserved]. For guidance see § 86.004–21.

(c)–(j) [Reserved]. For guidance see § 86.094–21.

(k)–(l) [Reserved]. For guidance see § 86.096–21.